Space Weather Forecast

Issued on Tuesday, 16 August 2022 at 12:10 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor Geomagnetic Storms likely from day 2 (17th). Moderate flares (R1-R2 Radio blackouts) likely throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is Moderate, with several Moderate-class flares in the last 24 hours. Three of these were from the largest and most active sunspot region, now located in the southwest quadrant, the largest a mid-class Moderate flare at 16/0758 UTC.

There are currently five numbered sunspot regions on the visible disc. The largest active region mentioned above is displaying strong spots with a complex magnetic configuration. Two other bi-polar regions, located in the northwest and southwest quadrants, are moderately complex, and of modest size. Remaining regions are small and decaying. Three new small sunspots are also in evidence, two regions towards the eastern limb, with the other in the southwest.

There are two modelled CMEs (Coronal Mass Ejections) from the 14th and 15th that have potential to reach Earth on 17th to 18th. A new CME was observed in the early hours (UTC) of 16th, from the most active sunspot, which has been modelled but results are still pending. Updated imagery is also awaited as to whether a further CME was associated with the mid-class Moderate flare.

Solar Wind / Geomagnetic Activity: The solar wind declined from slightly elevated levels to slow-ambient. The total magnetic field was weak throughout with only weak variations in the important north-south component. Geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be Moderate and currently there is a chance (15%) for activity to become High if there are any strong flares over the coming days. The most likely source region for a strong flare would be from the active sunspot region, which is now transiting into the southwest quadrant.

Solar Wind / Geomagnetic Activity: Solar winds are expected to be at slow-ambient levels over the next 24 hours. On day 2 (17th), Earth is expected to connect with the fast winds from a coronal hole. This enhancement is likely to be further enhanced by at least one CME, which is forecast to impact Earth around the same time frame. Geomagnetic activity is expected to be Quiet, with isolated Unsettled intervals on day 1 (16th). On days 2 and 3 (17th and 18th), activity is expected to become Unsettled to Active, and Minor Geomagnetic Storm intervals are likely. There is also a chance of a Moderate Geomagnetic Storm in association with the CME arrivals.

Energetic Particles / Solar Radiation: Solar radiation storms are unlikely, but there is a slight

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chance of an S1 or greater event due to the more complex regions on the visible side of the solar disc.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	60	40	20
Strong	G3	No	1	20	10	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	15	20
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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